REMARKS

Reconsideration and allowance of all claims are respectfully requested.

Claim 1 has been amended to address the rejections under 35 U.S.C. § 112. The amendment to the specification correctly identifies the elements in Figure 6. No new matter has been added by these amendments.

Applicant objects to the Examiner's citation of new art (Solomon) against the present claims in a first action **final rejection** when the new grounds of rejections were NOT necessitated by any amendments made by Applicant. The amendments in the last Response did not change the scope of the claims and were made to merely address the examiner's 112 issues in the first office action. Withdrawal of the finality and re-issue of a non-final office action are requested.

Claims 1 – 3 and 5-9 are patentable under 35 U.S.C. 102(b) over Solomon (U.S. Patent 5,009,777).

Contrary to the Examiner's contention, Solomon does not describe, teach, suggest, or inherently provide each and every element of the claimed invention.

The Examiner's contention in the office action "in reference to claim 1", first four lines is incorrect. Area 55a creates the space 41a, for which port 47a is connected to line 61a and valve port 65a, which in turn is connected to space 39a. In the reverse movement of piston 37a, the boring 109 (in reverse action of the valve) will experience the water supply pressure 23a, which is the same as in space 39a. In the working situation, fig. 2, the valve 65a is closed, whereby the pressure in space 41a will be lower than the water supply pressure ("the smaller pressure in 41a is going to make the power to generate a slightly higher pressure in room 43a"). See Solomon

col. 4, l. 25-50: "reverse osmosis and hot water system". Therefore face 55 in combination with the space 41a will not at any time create high pressure.

In this context it is also important to note a basic difference between the Solomon device and the present invention. The Solomon device is a "difference pressure device" and operates with three chambers – Contrastingly, the present invention (with analog wording) is a "non-difference pressure intensifier" and only operates two chambers. The return connection R (bottom left in fig 1) connects the working chamber to a tank in which the pressure is zero (or equal to ambient pressure). As the present device operates in the working condition (to the right in fig. 1) there are no differences in area to overcome – as is the case with the Solomon device.

Contrary to the Examiner's holding, Port 47 of Solomon is not a high pressure outlet port – see explanation above.

Further down in the same paragraph, the examiner refers to a changeover valve coaxially arranged in the low pressure cylinder. When comparing this feature to the present device it is clear that the feature of Solomon does not execute the same function. The "change over valve" does not control the space 39a. The "change over valve" can shut off the port 47a and 103 so the device is moving right when the pressure in line 61a – port 47a is low enough, and the "reversing chamber" 43a pumps out of port 49a to the one way valve 73a to line 21.

Page 4 of the office action 1st paragraph, states: "33" Is the device's body; would the Examiner intend it to be a reference to 133? Furthermore, the spring 59 is arranged around and engaging the cylinder 127, and not the rod 133.

In the device of the present invention the impulse springs 10 and 36 activates the impulse rod 24, which in turn moves the changeover valve, but only when the spring is fully loaded. This happens when the hydraulic force has moved the piston (see fig. 7) so that point 51 moves the

valve, when pos 35 is near the top position, the valve 19 due to the influence of spring 51 will be moved into one of two possible positions (indicated by the indentations 34).

The present invention has no "reset spring". The Solomon device is only operational in one direction and therefore needs a reset spring, whereas the present invention is double acting – operates uniquely in both movement directions. Thus, the Solomon device must have at least two springs on either side, but acting together. In this manner the radial forces will correspond to the "shifting valve". However, in Solomon water will flow past point 149.

Therefore, with respect to claim 1, it is clear that Solomon does not disclose a pressure amplifier remotely comparable to the present invention. The basic principles of operation are different. Just the fact that isolated features of the present invention may be read on the prior art does not deprive the invention neither of novelty nor obviousness.

With respect to claim 2 it is difficult to follow the examiner's arguments. "The resilient drives 151 are located in a bore drilled into the sleeve (127)". Reference element 127 refers to a moveable cylinder located in the right hand side of fig. 2, whereas 127 in fig. 4 refers to the device's body.

Furthermore, the recesses are not discernible in Solomon, whereas they are clearly identified (see element 34) in the present invention. From the illustrations of Solomon the only illustrated embodiment does not fix the rod 133, but allows it to move, such that the wedge 143 may move relative to the ball 153.

With respect to claim 3 "An annular groove provided on the inner side of the low pressure cylinder" may not be identified in Solomon. The examiner's reference to 127 again casts doubt as to what is intended. In fig 2, 127 is an inner cylinder defining the space 41a – which does not have an annular groove. In fig. 4, 127 is the body of the device which is

provided with an annular groove, presumably for fitting a stop limiting the movement of the cylinder (127 in fig 2) towards the right. Also from the description there is no clarification on these aspects.

This is also the case relating to the alleged U-shaped locking members. Solomon does not illustrate nor describe the U-shaped locking members. Basically, the locking constructions of Solomon and the present invention are different. Solomon is not clear on this point and does not illustrate corresponding locking means in any of the illustrations. In this connection U-shaped is not equal or corresponding to round. Solomon also does not illustrate that "the cam followers 153 engage with cam 143 that is chamfered". These aspects are neither illustrated nor described by Solomon. Solomon describes 139 and 141 as flanges, not as chamfered sides.

To further emphasize the differences between prior art represented by Solomon and the present invention the attention is directed to a problem with the Solomon device which will arise if used as a pressure amplifier within the meaning of the present invention.

If the valve body 107 moves forward during the shift close to its extreme right position (see figures 3 and 5) the water entering through opening 109 will be entering the chamber and pushing valve body 107 due to the forces of the water. Then the Solomon device will be stopped, if as illustrated in figure 3, the piston due to its shifting time between position 1 and 2 will be stopped by the water. Only an O-ring maintains the valve body 107 from trying to shift to the right (when position 139 has gone from left to right as illustrated in figure 3).

The present invention on the other hand maintains a firm hold on the shifting valve at all times such that when shifting only the face, see figure 7 position 51, it will have to overcome the shrink forces in springs 10, 36, such that the dead points are overcome whereby the hydraulic piston 26 and the faces position 51 of the shifting valve are never left in the middle, but always

due to the action of the springs will be in one or the other position. The present invention therefore does not allow the valve to shift in the middle of a movement but will only shift once the shifting springs 10 or 36 have been sufficiently loaded such that they will push the valve body in the opposite direction.

Contrastingly, Solomon cannot make the jump in that the rod 133 in the spring 59a hinders the movement between the positions. The pushing piston 37 may be forced/urged in one direction, whereas the valve body 107 determines the action and as such may move in the opposite direction, i.e. go from position 1 to position 2 at the same time. In this situation, when the valve body 107 is not influenced by any force, the entire device will stop. The water flow will urge the valve body 107 to the right without shifting the balls 153 such that the valve 107 will be open and on the other hand the smaller piston 139, see figure 3, will try to move the valve body to the left since the locking balls 153 are still on the right side of the wedge, see figure 3.

The present invention operates in a system where it is essential to maintain the shifting valve in its position until the actual springs 10, 36 are loaded to such an extent that they will be able to force the valve body past the dead point and into the opposite working position. The device according to Solomon has not foreseen this action and is not suitable to be modified in order to provide the same action as the present invention.

With reference to claim 5 it is not correct that the flanges are further held in place by retaining ring 157. Turning to figure 2 it is clear that the ring 157 only serves to limit the movement of the rod 133 such that the engagement of the ring 157 with the ring 159 limits the movement of rod 133. It is also submitted that Solomon does not provide a construction where the various rods etc. are loosely connected. Solomon does not use loose mounting connections.

The high pressure piston is held by means of a locking ring, see position A of figure 7 in the present invention.

Furthermore, as far as Solomon's express teachings as best understood, Solomon has only one body in that low and high pressure piston 37 is one and the same member. It is therefore not necessary for the Solomon device to have a construction as disclosed in the present invention. The present invention furthermore utilizes the high pressure piston as an impulse rod 24, see for example figure 7 position 12. This is a further constructive difference between the present invention and the Solomon device which is based on the basic difference in that the Solomon device is not a high pressure intensifier within the meaning of the present invention. Furthermore, the feature with reference number 157 in figure 2 of Solomon is not a mounting connection, but a construction element which in order to function has to be loose such that water can run freely in and out through 159 and 157.

In order to illustrate the differences between the present invention and the Solomon device it is interesting to look at a comparative calculation of the forces generated by one device in comparison to the other. For example taking the measurements used in the Solomon disclosure the low pressure area will have an area of 13.8 cm2, face 55a 4.5 cm2 and room 43a 4.5 cm2. With a water supply pressure 23a of 3 bars and a pressure in the room 55a being 0 there is a force of 13.8 x 3 equivalent to 41.4 kilos urging piston 37a to the right minus the spring force of 59a. This force shall overcome the actual force caused by the locking system 151 which must be calculated on the safe side, for example having a total force of minimum 4 kilos which results in a force of 37.4 kilos divided by 9.3 (the conversion to bars), equivalent to 4.02 bars. Therefore, the pressure generated in room 43a port 49a port 103 to the close valve 71a and lifting the no return valve (one way valve) 73a and being transferred into the heat system 19a by line 21a is

approximately 4 bars. This is enough to overcome the water pressure of 3 bars. It is therefore possible for the Solomon device to overcome the 3 bar pressure from the water supply such that it is possible to insert new water into the existing water system.

Turning to the amount of water, i.e. the handling capacity, for example 5 liters per minute, it is possible to calculate the effective force that the Solomon device is able to handle. If it is estimated that the Solomon device has two cycles per second, i.e. moves back and forth and thereby creates two "high pressure" water pulses which seem to be on the very high side for the Solomon construction, a high estimate of the generated power will be 0.044 hydraulic horsepower. If the same areas as mentioned above are utilized with a device according to the present invention, and recognizing that the present invention will intensify the pressure three times due to the double action, an output of approximately 800 bars will be generated which corresponds to 6-8 hydraulic horsepower or 135 times as much energy as will be generated with the Solomon device.

As already explained above, the Solomon device will have a tendency to stop due to the not determined position of the valve body 107 and therefore it will not be possible to increase the pressure in the Solomon construction. This also reflects in the operating cycles of the different devices. As already mentioned above it is estimated that the Solomon device will be able to carry out two cycles per second which requires a return time for the Solomon device of approximately two seconds whereas with the present device 0.01 second is necessary at the much higher pressure due to the double action construction of the present invention.

Turning to claim 7 it is an important feature of the present invention to provide the bores and channels in the manner set out in dependent claim 7. The shifting valve and the radial grooves in the big area opening connecting the bore with the groove, see figure 5 position 42 in

the present application, substantially lessens the hydraulic power loss compared to normal boring solutions such that the connection between the radial bore from room 40 connecting groove 39 to actual boring 41 substantially reduces the hydraulic pressure and thereby makes it feasible to have the very high power output as already explained above. It is, however, true that the actual method of providing these channels may not be the basis for a patentable idea, but as Solomon does not provide these types of borings, the underlying principle of having the relatively large openings in order to reduce the hydraulic power loss is not disclosed by Solomon.

As to claim 8, even if the pressure pump of Solomon is used to try the osmosis module 15, yet, the pressure for driving this osmosis module is as illustrated above less than 1 bar, and it is not the pressure pump that drives the osmosis module, it is the water pressure which the pressure amplifier of Solomon uses to produce the 1 extra bar over the water pressure. The water, see figure 4, flows out of port 51, pushes piston 37 towards face 55a and supplies approximately 3 bars to the osmosis system 15a directly from 23a. When the piston 37a, see figure 2, moves to the right, the action is explained in Solomon column 4 lines 25-65: "However, the pressure in the outlet chamber acts on the reverse osmosis module 15 to begin the production of product water and when this occurs the pressure in the outlet chamber 41 drops sufficiently so that the feed water under pressure in the inlet chamber 39 can move the piston 37 to the right on its pumping stroke." From this it is clear that the water pressure in the reversing chamber 43 is higher as to feed water, so that valve 73 may open.

Returning to the calculations mentioned above the pressure in the chamber 41 must be approximately 0 or just above 0, such that a very slight water pressure is the result of the osmosis pump 15. Again, returning to the calculations mentioned above, the present invention provides pressures of 2-300 bars which would create a substantial pressure in the osmosis pump. The idea

with the Solomon device is overall just to provide a pressure slightly above the water mains pressure, such that the osmosis pump 15 will be able to force extra water when needed into the water system without bursting the pipes as would be the result if a device according to the present invention would be installed in the system.

Turning to claim 9 this analysis is also based on a misunderstanding. Attention is drawn to page 15, line 25, of the present invention's description where figure 6 is described. Figure 6 illustrates a special shifting valve for double acting intensifiers also used in figure 7. Pressure is built up inside the valve. In figure 1 inside the valve showing point 25 of the impulse rod and inside the inner valve housing 7 Solomon does not have a build-up of pressure or this problem since the overall pressure in the Solomon device is ultra-low. The pressure at point 24 in connection with the impulse rod may be as high as 300 bars, and if the inside diameter is 25 mm, it provides an area on which area a force of 6,594 kilo force is acting on the shifting valve having a 0.01 mm tolerance with the housing.

The value 50, see figure 6, is connected to the inside by at least one boring 48 leading to the inside of the valve, so there is a hydrodynamic balance between the inside and the outside forces. This hydrodynamic balance which is well-known in the art, is now used to make sure that the intensifier continues to work regardless of the pressure distribution inside the valve. The chamber 14 of figure 6 is therefore connected to low pressure at approximately half the time and to the tank's almost ambient (or zero) pressure the other half of the time as is the groove 30 in figure 7.

Therefore, the Solomon device differs fundamentally from the present invention and as such cannot anticipate nor render obvious the claimed invention. To be anticipating, a prior art reference must disclose "each and every limitation of the claimed invention[,]... must be

enabling[,] and must describe...[the] claimed invention sufficiently to have placed it in possession of a person of ordinary skill in the field of the invention." In re Paulsen, 31 USPQ2d 1671, 1673 (Fed. Cir. 1994).

For at least the above reasons, the rejection of Claims 1 – 3, 6, and 8 under 35 U.S.C. 102(b) over Solomon is improper and should be withdrawn.

Claims 4 and 10 are patentable under 35 U.S.C. 103(a) over Solomon (U.S. Patent 5,009,777) in view of Isamu et al. (Japanese Patent Application 2000-87906).

"To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations." *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991) (emphasis added).

Claims 4 and 10 depend from Claim 1, share its patentable features, and add further patentable limitations. Solomon, as pointed out above, does not describe or teach the claimed invention. Therefore any further combination with other references will also lead away from the present claims.

Isamu does not provide what is lacking in Solomon. Indeed, the Examiner admits that Isamu does "not teach that in connection with the valve there is arranged at least on spring coaxially around the impulse rod." Furthermore, the conclusions drawn by the Examiner with regards to Isamu do not appear to be supported.

For example, the Examiner argues that elements 6 and 7 are high pressure pistons and high pressure producers. However, the translation describes elements 6 and 7 as "high voltage birth parts." This appears to contradict the Examiner's interpretation of these elements. The Examiner argues that Isamu teaches a second operational area of the same size or less than the first operational area because "end surfaces (2a and 2b) of the pistons are smaller than the flange (21)." However, a comparison of front end surface 2a and back end side 2b of a spool 2 with the size of a flange 21 does not appear to relate to the sizes of operating areas.

Introductory port 4 is described by the Examiner as a "low pressure area", which appears to have no textual support, and argues that it communicates with front part pressure introduction room 5b, which the Examiner describes as an operational chamber. This interpretation does not appear to be supported. Sleeve 19 is described by the Examiner as a changeover valve. None of this is apparent from the reference.

In addition, the Examiner asserts that numerous elements are taught by Isamu without giving any reference numbers or means for identifying the alleged components. For example, the impulse rod, low pressure connection, and check valve are not identified. Without this information, applicant is unable to determine Examiner's basis for the rejection of each of the claims.

That [the prior art] might incorporate elements which could be used in appellants' system does not render appellants' claims obvious when there is no suggestion of using these elements in substantially the same manner as appellants use them. *In re Donovan*, 184 USPQ 414, 421 (CCPA, 1975).

Obviousness is tested by what the combined teachings of the references would have suggested to those of ordinary skill in the art. It cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching or suggestion

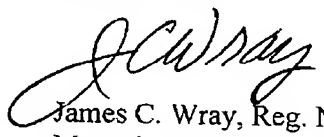
supporting the combination. Teachings of references can be combined only if there is some suggestion or incentive to do so. *In re Fine*, 5 USPQ2d 1596, 1599 (Fed. Cir. 1988).

For at least these reasons, the rejection of Claims 4 and 10 under 35 U.S.C. 103(a) over Solomon and Isamu is improper and should be withdrawn.

CONCLUSION

Reconsideration and allowance of all claims are respectfully requested.

Respectfully,



James C. Wray, Reg. No. 22,693
Meera P. Narasimhan, Reg. No. 40,252
1493 Chain Bridge Road, Suite 300
McLean, Virginia 22101
Tel: (703) 442-4800
Fax: (703) 448-7397

Date: April 24, 2009